

Farmer Climate Risk Management: Insights into climate change adaptation capacity

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Abstract

Consensus is emerging that climate change is likely to result in an increase in weather extremes. Farmers, who are highly sensitive to climate extremes, present an opportunity to investigate decision making related to managing climate risk, providing insights into managing uncertainty associated with future climate change. Through surveys, interviews, and focus groups with farmers in Eastern New York State, we are studying climate risk management with two aims: first, to "map" mental models of frequency distributions of important extreme events of Northeast farmers and the relationship to adaptive strategies, and second, to assess farming system resilience to climate extremes. Products of this work will include improved decision support materials in the context of climate risk associated with climate extremes.

I. Introduction

Much work has been done on risk perception, cognitive biases in assessing risk, and the influence of emotion and experience in constructing responses to uncertainty. In the context of climate change adaptation, the over weighting of recent events in building mental models of climate distributions may provide a positive bias favorable to adaptation if climate trends continue. Similarly, long planning horizons by decision makers may favor adaptation strategies that consider building resilience to extremes over short term responses. This work utilizes the context of farmers as decision makers highly exposed to weather extremes to investigate these issues.



II. Methods

We are using mailed surveys and on-farm interviews to collect information from dairy, vegetable and fruit farmers in the Hudson Valley of eastern New York. Data collected focuses on farm history, memory of extreme climate events and the impact of more frequent anomalies, and management responses to those anomalies. Daily climate data from stations reporting in the region extending from 1950-2000 is used to assess trends in extreme events. Results presented here are responses (n=74) from the first set of mailed surveys (spring 2005) and interviews in progress.

III. Highlights of Initial Results

Farmer Profiles

The distribution of farm types represented in the survey roughly reflects the make-up of the farm sector in the Hudson Valley (Figure 1), which is traditionally dominated by dairy and tree fruit though both of these products are in decline. The long experience, both direct and via family history, and expectations of future farming suggest a long planning horizon for many of those surveyed (Table 1).

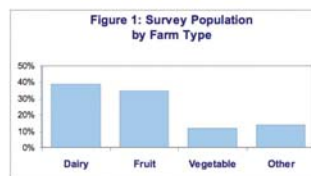
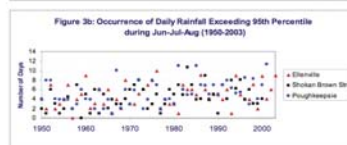
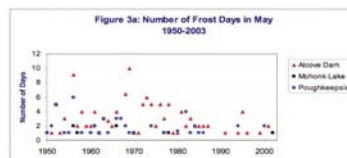


Table 1: Farmer History and Expectations

Farming 30 years or more	52%
At least second generation farming	78%
Expect next generation to continue farming	29%

Extreme events: Perceptions and Observations

Excess rainfall and flooding was the most commonly cited extreme event, both as the "worst event" ever experienced (Figure 2) and as recurring problematic weather anomalies. Cold, both experienced as winter storms and as late spring freezes, was also commonly mentioned, in spite of a possible increasing trend in minimum temperatures seen in the 50-year record (Figure 3a). Analysis of daily climate data from stations in the region show do show a possible weak trend of increasing extremes in precipitation (Figure 3b). This supports the observations of some farmers who noted trends in the occurrence of extreme weather events (14% of farmers), 45% of whom perceived an increase in the frequency of floods and heavy rain. The summer of 2004 was particularly wet and may have influenced farmers' perception regarding the relative frequency of heavy rainfall.

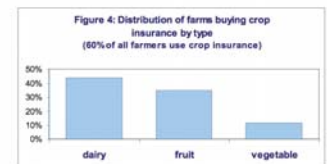


Management Strategies

Climate risk management strategies tended to fall into three main areas:

- Financial instruments
- Technology adoption
- Product diversification

Reliance on crop insurance (Figure 4) or disaster assistance was high. Examples of technological adaptation are the purchase of larger generators to protect against snow storm-related power outages and purchasing equipment to harvest hay as baleage which does not need dry weather to cure. Product diversification is commonly observed among farmers who are seen as innovative and "successful", though some farmers noted that crop varieties able to withstand wide variation in weather is preferable to maintaining a large diversity of crops because of labor requirements.



IV. Initial Conclusions

Farmers in the Hudson Valley, as elsewhere in the US, face multiple risks in addition to weather extremes that threaten sustainability of farm operations. Thus, farms that are thriving are often those that are innovative and have learned to adapt to a changing environment in many ways. Cognitive biases regarding climate may encourage some of this innovation. 19% of farmers noted an increasing trend in rainfall extremes, and a greater number note heavy rain as a problem and have adopted strategies to deal with it, indicating that recent heavy rain is influencing management strategies.

Strategies adopted carry different implications for long term sustainability. We subjectively suggest that the use of crop insurance, the purchase of costly equipment, and the diversification of farm products and markets are posed on a continuum from least likely to more likely to improve sustainability, respectively, in the face of climate change. Additional work over the following two years will provide additional data for exploring the relationships between cognitive biases, planning horizons and climate adaptation.

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